

REVIEW OF NEW SPECIFICATION OR SPECIFICATION CHANGE

105-108

Specification Section No.: 105, 106, AND 203

Item: Quality of Embankment

Originating Office: MAC

By: Christopher Russell

Date Sent For Review: 09.26.16

Date Comments Due: 10.24.16

**Submit response to: STANDARDS AND SPECIFICATIONS UNIT, DIVISION OF PROJECT SUPPORT
4TH FLOOR, CDOT HEADQUARTERS**

Vote Y/N	Concurrent Reviews – Others Commenting	
	Spec Committee Members:	✓
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	PDAC	
	Drainage Advisory Committee (DAC)	
	Water Quality Advisory Committee (WQAC)	

The attached Draft Specification is submitted for your review and comments. If not returned by Date Comments Due, the draft specification will be considered to be approved unless the Standards and Specifications Unit of the Project Development Branch [(303) 757-9474, (303) 757-9402] is advised otherwise.

REMARKS:

If these proposed changes are approved, our unit will issue these in a revised version of this Sample Project Special Provision.

REVIEWER COMMENTS:

() Approved () Disapproved () Modified

If disapproved or modified, give reason why and show any modifications on the attached draft copy:

Name/Signature

Date

COLORADO DEPARTMENT OF TRANSPORTATION SUBMITTAL OF NEW SPECIFICATION OR SPECIFICATION CHANGE		Log No. (Assigned by Standards and Specifications Unit)
TO: Standards and Specifications Unit, Project Development, Suite 290		FROM: Materials Advisory Committee (Region, Branch or Technical Committee)
SPECIFICATION SECTION NO. 105, 106, 203	ITEM Quality of Embankment	Priority Routine <input checked="" type="checkbox"/> Fast <input type="checkbox"/>
Reason for this new or changed specification: The Project Special Provision was updated to tighten Contractor PC requirements, and to add language on required Contractor PC Plan and Documentation that are consistent with the new revisions to the 203 Specification. The changes were developed under a Materials Advisory Committee (MAC) Task Force TF 2015-01 involving the Colorado Contractors Association. The specification changes were approved by the MAC.		
New or Revised Specification: See Attached.		
NOTE: See Procedural Directive 513.1 for a description of appropriate specification development procedures.		

REVISION OF SECTIONS 105, AND 106, AND 203
QUALITY OF EMBANKMENT

Sections 105, 106 and 203 of the Standard Specifications are hereby revised for this project as follows:

Subsection 105.03 shall include the following:

Conformity to the contract of embankment construction shall be determined in accordance with the following:

(a) **Process Control Plan.** The Contractor shall be responsible for **Process Control (PC)** for all embankment material and embankment construction on this project. The Contractor shall submit a written **Process Control Plan (PCP)**, including a methods statement, to the Engineer for acceptance. The **PCP** shall include the following:

- (1) Identification of the supervisor and technicians that are responsible for implementing the PCP throughout construction. The Contractor shall demonstrate that an appropriate number of technicians/inspectors will be present on the project to accommodate the laboratory testing and inspection items that are required to maintain PC requirements specified for daily earthwork operations.
- (2) Identification of the laboratory to be used throughout the project to conduct PC testing. The CDOT Central lab and the CDOT Regional labs will be not responsible for running tests on materials submitted to meet Contractor PC Requirements.
- (3) Methods to separate, process, or supply material for embankment fill that meets the material requirements specified in the contract documents.
- (4) Methods to control and document foundation preparation prior to placement of embankment fill; which will include clearing and grubbing in accordance with Section 201, removal of all top soil in accordance with Section 207, removal and replacement of any unsuitable material identified during excavation or foundation preparation, and scarifying, moisture conditioning, and compaction of the final embankment foundation surfaces using methods appropriate for the material types present.
- (5) Methods to control and document that placement, lift thickness, moisture conditioning, compaction equipment and methods, and compaction observation/testing are appropriate for the embankment material types being placed.
- (6) Methods to identify and communicate changes in embankment fill being placed that would require modification of placement, moisture conditioning, compaction methods, observation, and testing.
- (7) A plan to notify or communicate in advance to CDOT's Engineer to satisfy OA testing requirements to minimize construction delays.
- (8) List of all inspection and materials testing forms and procedures to be utilized by the Contractor.
- (9) Adherence to Table 106-4 requiring minimum testing frequency.

The Contractor shall submit the **PCP** at least five working days prior to the start of the work. The Engineer's review of the **PCP** will not exceed two working days. Work shall not begin until the **PCP** has been accepted in writing, unless otherwise approved.

(b) **Documentation.** The Contractor shall maintain current records of process control operation activities, **observations made**, and tests performed. These records shall be in the form shown in the **PCP**, and shall be submitted to the Engineer **on a daily basis** documenting any earthwork-related activities from the prior day. Documentation shall include at a minimum:

- (1) Activities performed by the Contractor, subcontractors, personnel working, and equipment being used.
- (2) Weather conditions for the day and any impact that weather had on the work.
- (3) Construction delays and their cause.
- (4) A description of work performed that conforms with the Contract Documents, and a description of defective or deficient work that is not in compliance, and any corrective action taken.

- (5) Documentation of the material type being placed, location of where material is being placed, lift thickness, moisture conditioning methods, compaction equipment and methods, and observation and testing of the material placed for every lift of embankment fill constructed.
- (6) Documentation of changed material types and corresponding changes to placement, moisture conditioning, compaction methods, and observation/testing methods.
- (7) Daily test results, daily inspection reports, and monthly certification reports when required.

In addition to daily documentation requirements, a statement that work incorporated in the project complies with the Contract shall be submitted to the Engineer prior to payment for the work or upon request. Monthly certification reports shall be stamped with the seal of a Professional Engineer registered in Colorado. Failure to provide the Engineer with the necessary documentation may result in the suspension of work on embankment until the documentation has been completed and accepted by the Engineer. CDOT Owner Acceptance testing shall not be used as supporting documentation for the Contractors certification. CDOT or CDOT's certified representative will be responsible for Owner Acceptance testing (OAT) and Independent Assurance Testing (IAT).

Add subsection 106.041, immediately following subsection 106.03 as follows:

106.041 Embankment Testing. The Supervisor responsible for implementing the Process Control Plan and for oversight to implement required sampling and testing frequencies shall be identified in the PCP and be qualified according to the requirements of CP-10 (Note: this will require a PE or a NICET Level III certification). The technicians taking samples and performing tests shall be qualified according to requirements of CP 10 (Note: this will require WAQTC [Western Alliance for Quality Transportation Construction] qualification and certification through CDOT's Soils, Excavation, and Embankment certification program). At least one technician will be designated full time on the project who will have a minimum of one year of experience with soils testing and inspection of earthwork projects. The project verification sampling and testing procedures shown in the CDOT Field Materials Manual under the frequency guide schedule for minimum materials sampling, testing and inspection shall be used for the elements shown in Table 106-4.

**REVISION OF SECTIONS 105, 106, AND 203
QUALITY OF EMBANKMENT**

**Table 106-4
EXCAVATION AND EMBANKMENT TESTING SCHEDULE**

	Element	Minimum Testing Frequency Contractor's Process Control	Minimum Testing Frequency CDOT's Owner Acceptance
Soil Embankment with < 30% Retained on ¾-inch Sieve	In-place Density / Relative Compaction	1 per 500 cu yds. or fraction thereof with one additional test required per change in material type.	1 per 1,000 cu yds. or fraction thereof with one additional test required per change in material type.
	In-place Density / Relative Compaction within 100 feet of bridge approach.	1 per 250 cu yds. with minimum two tests per lift, and one additional test required per change in material type.	1 per 500 cu yds. with minimum one test per lift, and one additional test required per change in material type.
	Moisture Density Curve	1 per 10,000 cu yds. with one additional test required per change in material type.	1 per soil type.
	Moisture Density One-Point Verification	1 per 2,000 cu yds, with one additional test per change in material type. Minimum of one test per day.	1 per soil type.
	Soil Classification (AASHTO M145)	1 per 2,000 cu yds, with one additional test per change in material type. Minimum of one test per day.	1 per soil type.
	Gradation	1 per 2,000 cu yds, with one additional test per change in material type. Minimum of one test per day.	1 per soil type.
	Atterberg Limits	1 per 2,000 cu yds, with one additional test per change in material type. Minimum of one test per day.	1 per soil type.
Soil Embankment with > 30% Retained on ¾-inch Sieve, Rock Embankment, & Rock Fill	Test Strip Construction and Acceptance	1 test strip required per change in material type.	Observation and acceptance of roller pattern, moisture conditioning, and proof rolling.
	Soil Classification (AASHTO M145)	1 per 2,000 cu yds, with one additional test per change in material type. Minimum of one test per day.	1 per soil type.
	Gradation	1 per 2,000 cu yds, with one additional test per change in material type. Minimum of one test per day.	1 per soil type.
	Atterberg Limits	1 per 2,000 cu yds, with one additional test per change in material type. Minimum of one test per day.	1 per soil type.
	Slake Durability	1 per 2,000 cu yds, with one additional test per change in material type. Minimum of one test per day (for sedimentary rock only).	1 per stockpile / borrow source and 1 per material type for sedimentary rock only.

Qualifications for testing and personnel are contained in Section 203, Chapter 200 of the CDOT Field Materials Manual, CP-10, CP 13, CP 15, and CP 80, and the CDOT Inspectors Checklist.

All costs associated with the Contractor's Process Control efforts will not be measured and paid for separately but shall be included in the work.

[Subsections pertaining to Section 203 have been incorporated into the proposed new Standard Special Provision, Revision of Section 203, Excavation and Embankment.]

INSTRUCTIONS TO DESIGNERS (delete instructions from final draft):

Use this Project Special Provision on projects having more than 100,000 cubic yards of Embankment Material (Complete in Place), Unclassified Excavation (Complete in Place), Borrow (Complete in Place), or other projects as selected by the Project Manager.